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THE ROSES OF PECOS, NEW MEXICO.

BY T. D. A. COCKERELL.

Pecos, New Mexico, is on the upper Pecos river, about 6,800 feet above sea level and no very great distance from Santa Fé. It has essentially the flora made familiar to botanists everywhere by the collections of Fendler and Heller, the cañon a few miles above the village furnishing *Galpinsia fendleri* (Gray), *Cereus triglochidiatus* Engelm., *Sphæralcea fendleri* Gray, *Viola neomexicana* Greene, *Berberis fendleri* Gray, *Linum australe* Heller, *L. puberulum* (Engelm.), *Verbena macdougali* Heller, *Philadelphus microphyllus* Gray (the flowers of which have an odor like that of spoiled oranges), *Salix irrorata* Anders., *Sidalcea neomexicana* Gray, etc., etc. The bottom land through which the Pecos river flows is thickly wooded for a few miles on the Kin Kale Ranch, the trees being *Populus angustifolia* James, with a mixture of willows, *Alnus tenuifolia* Nuttall, and on the outskirts *Quercus novomexicana* (A.DC.), *Q. leptophylla* Rydberg (new to New Mexico), etc. Under the shade of the trees it is cool and moist, so that members of the Canadian zone flora are able to grow, while a few hundred yards away the dry bluffs possess a typically austral and xerophytic assemblage of plants. As a result of these conditions the locality, taken as a whole, is remarkably rich in species of both plants and animals. The roads and cultivated fields are skirted by oak-bushes, including the peculiar *Quercus havardi* Rydberg, only known previously from Texas. Roses are abundant, and a few species of climbing plants (*Clematis ligusticifolia* Nutt., *Humulus lupulus neomexicanus* Nelson and Ckll., *Parthenocissus quinquefolia* (L.) Planch) are very conspicuous. The common weeds include *Grindelia inornata* Greene, *Lathyrus decaphyllus* Pursh, *Argentinia anserina* (L.), *Vicia americana* Muhl., *Salsola tragus* L., *Anogra coronopifolia* (T. and G.), *Verbascum thapsus* L., *Erodium cicutarium* (L.), *Physalis pubescens* L., *Allionia viscida* (*Oxybaphus angustifolius* var. *viscidus* Eastwood, *Pr. Cal. Ac. Sci.*, 1896, p. 313), *Solanum jamesii* Torrey, *Helianthus petiolaris* Nutt., *H. annuus* L., etc. Quite a surprise was the discovery of a large quantity of *Chrysanthemum leucanthemum* in a field on the Kin Kale Ranch, this plant being hitherto unknown in New Mexico. The austral *Solanum elæagnifolium* was seen growing near Harrison's Store, while *Sophia halictorum* Ckll. (with the beetle *Phyllotreta pusilla* Horn, living upon it), occupied the roofs of adobe houses in the village. At the Old Pecos Pueblo, a few miles to the south, we found *Astragalus simulans* Ckll., hitherto only known from Las Vegas. *Malvastrum cockerelli* A. Nelson, was very common on the Kin Kale Ranch; so also was the beautiful *Touterea rusbyi* (Wooton). *Fallugia acuminata* (*F. paradoxa acuminata* Wooton) and *F. acuminata micrantha* (*F. micrantha* Ckll.) formed large patches, and were very attractive to insects. The scarlet *Castilleia integra* Gray, with the large-bracted form *intermedia* Ckll., were very conspicuous. A single plant of *Datura tatula* L., is worth recording; it is, of course, an accidental introduction. *Onosmodium thurberi* Gray, grew in some quantity by the Pecos river.

Spending a summer in this beautiful place, I took the opportunity to study the native roses. The result of this study is here presented, not because I have reached any final or dogmatic opinions, but because it seems that field-study in many different localities is the only method whereby the species of the group Cinnamomeæ will ever be understood. When we have accumulated a sufficient number of observations on the living plants, some talented botanist may find himself able to tell us what they all mean; but for the present observations are perhaps of more consequence than deductions.

A large part of the material studied was collected and brought to me in the living state by Dr. M. Grabham, of Jamaica, who spent part of the summer at Pecos. I was able to distinguish three main forms, two of which are here introduced as new. While it is difficult, if not impossible, to state definitely how many valid species exist among the Cinnamomeæ, it seems much better to designate the recognizable forms by name, than to lump them indiscriminately under the few specific titles. It is just this process of lumping which has made so much confusion, the same name being applied to a different plant by each of several authors. The characters of the three forms referred to may best be set forth in parallel columns.

Rosa arkansana Porter, var. *a.*	*R. prætincta*, n. sp. (or var.?).	*R. pecosensis*, n. sp. (or var.?).
Low bush.	Rather low bush.	Usually high bush.
Flowers about 45 mm. diam., pink, petals white at base.	Flowers pale pink.	Flowers about 50 mm. diam., deep crimson, petals white at base.
Flowers many together. Anthers longer.	Flowers usually in threes (2+1), sometimes 2 only, sometimes 4.	Flowers in pairs, or often single. Anthers shorter.
Stigmas pinkish in bud, without any pink in open flower.	Stigmas deep red in bud, pale pinkish in open flower.	Stigmas pinkish in bud, pale yellow in open flower.
Sepals foliolar-tipped, narrow, with woolly edges, entire, with many reddish stout gland-hairs beneath and on the sides of the apical half.	Sepals quite glandular, the outer with linear lobes.	Sepals foliolar-tipped, narrow, with woolly edges, with linear lateral lobes, and wholly without reddish gland-hairs.
Sepals very long (up to 21 mm.), projecting far beyond bud.	Sepals short (up to 13 mm.), not projecting much beyond bud.	Sepals medium (up to about 15 mm.), projecting moderately beyond bud.
Fruit (Aug. 13) smooth, globose, neckless, the sepals erect.	Fruit globose.	Fruit globose, 8 mm. diameter, with hardly any neck; sepals persistent, erect, but reflexed immediately after flowering
Buds very glandular. Peduncles glabrous, shining.	Buds glandular.	Buds minutely pubescent, not glandular. Peduncles sparsely sublanate with scattered hairs.
Prickles slender and scattered on stems; few and scattered on flowering branchlets; straight.	Prickles on old growth few and straight; green parts unarmed.	Prickles slender and scattered on stems; few and scattered on flowering branchlets, where they are more or less hooked.
Infrastipular spines none, or not distinguishable from the others.	No infrastipular spines.	Infrastipular spines absent, or sometimes present in pairs, all on same branch.
Stipules broad (diam. about 12 mm.), resinous, not villous.	Sitpules often narrow.	Stipules narrow (diam. about 6 mm.), sparingly villous beneath, not glandular.

Rosa arkansana Porter, var. *a*.	*R. prætincta*, n. sp. (or var.?).	*R. pecosensis*, n. sp. (or var.?).
Petioles glabrous, with numerous knobbed gland-hairs.		Petioles minutely pubescent, not glandular.
Leaflets 7 on flowering branches, 9 on new shoots from base.	Leaflets commonly only 5, often 7, often 5+ an odd basal one.	Leaflets 7, sometimes 9, sometimes 5, with an odd basal leaflet making 6.
Leaflets mostly smaller and broader, *e.g.*, 20 mm. long, 16 broad; lateral leaflets almost sessile, except on basal shoots; midrib beneath glabrous, with numerous short red gland-hairs; serrations minutely serrulate, with numerous small knobbed glands.	Leaflets unusually long and narrow, *e.g.*, 25 mm. long, 13 broad; cuneate at base; resin-dotted beneath, midribs without obvious gland-hairs; serrations deep and simple, margin without gland-hairs.	Leaflets mostly larger and narrower in proportion, *e.g.*, 33 mm. long, 20 broad; lateral leaflets distinctly petiolulate; midrib beneath lanulate with short hairs, not glandular; serrations simple, sharp, margin minutely hairy, not glandular.

All these plants have dull green foliage, not shiny, as Elias Nelson describes *R. woodsii*. This also separates them from *R. neomexicana* Ckll., of southern New Mexico, described in *Entomological News*, February, 1901, p. 41.[1] This *Rosa neomexicana* is further distinguished by the oblong fruits, which are small and scarlet, with persistent erect sepals. It also has normally pairs of infrastipular spines, and mostly solitary flowers.

Rosa pecosensis is one of the most beautiful roses known to me. The type was collected by my wife and Dr. Grabham, about six miles up the cañon above the Kin Kale Ranch, June 1, 1903; but the plant is also common down as far as the village of Pecos. When the flowers first open the petals are depressed, so that they lie below the plane, the surface of the flower becoming convex. A curious character observed is the presence of a deep notch in one petal only, always an inner one. The flowers vary in size down to about 42 mm. diameter, or occasionally only 37 mm.

If the three roses described above always held their characters, there would be no hesitation about regarding them as distinct species. Specimens occur, however, which vary in different ways, and some of them appear to connect the main types. It is possible that this may in part be the result of hybridization, but we are not entitled to assume this without better evidence. The observed variations are as follows:

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[1] The article containing this description was intended for *Proc. Acad. Nat. Sci. Phila.*, but was transferred to the *News*, for which it is altogether too botanical.

Rosa pecosensis.

(1) Upper Pecos-town, June 19. Flowers very fragrant, about 37 mm. diameter; sepals entire, rarely with linear lobes; leaflets minutely resin-dotted beneath; leaflets on basal sheets sometimes eleven. Infested sparingly by *Eulecanium*.

(2) Kin Kale Ranch, June 21 (Grabham). Flowers bright pink, not so dark as some; 45 mm. diameter; no strongly notched petal; sepals rarely with linear lobes; stipules 5 mm. broad or rather more; leaflets 7.

(3) Kin Kale Ranch, June 21. (Grabham.) As usual, except that the sepals sometimes show some marginal red knobbed gland-hairs.

(4) Kin Kale Ranch, June 21. (Grabham.) Flowers very deep red; outer sepals with quite a number of red gland-hairs; midribs of leaflets beneath with scattered very short and minute red gland-hairs; leaf-margins inclined to be doubly serrate, the secondary serrations gland-tipped; leaflets almost sessile; flowers single. This is in many respects like the *R. arkansana* var. *a*, and could be a hybrid, if hybrids occur.

(5) Kin Kale Ranch, June 21. (Grabham.) Typical, but stipules variable up to 8 mm. broad.

(6) Kin Kale Ranch, June 21. (Grabham.) Flowers paler, rose-pink, about 36 mm. diameter; leaves unusually large (upper lateral leaflets up to 33 mm. long); midribs of leaflets lanulose beneath, with only rudimentary gland-hairs; leaflets deeply and simply notched; sepals lanulose, not glandular, with linear lateral lobes; flowers solitary or in pairs; stigmas yellowish in rather advanced bud. This is essentially *pecosensis*, the only material difference being in the paler flowers. Seen from a distance, the flowers of *R. pecosensis* always appear single, as one bud of a pair comes out before the other. The plants are sometimes infested by prickly leaf-galls, of the species *Rhodites spinosellus* Ckll.

Rosa prætincta.

No varieties were found. In Watson's table this species runs to *R. blanda*, except that the sepals are not entire. In Crépin's table it also runs to *blanda*, except that the flowers are comparatively small. There is no *R. blanda* in New Mexico, however.

Rosa arkansana var. *a*.

I had considered this to be the true *R. fendleri* of Crépin, not of S. Watson. Dr. Rydberg, to whom I sent a copy of my description, wrote that he could not agree with this, but that I apparently had the long-lost *R. arkansana* Porter, only certainly known by the original collection by Brandegee. As this seems reasonable, I provisionally call my plant *arkansana,* the more willingly since the name has priority over *fendleri,* supposing them to refer to one species. The material described above grows by a small irrigation ditch in open unshaded ground, which except for the ditch is very dry. On August 13 a fruiting bush of the same species was found close to the Pecos river, more or less in the shade. It possessed the following characters:

Fruit very shiny, smooth, globose (long. 9½, lat. 9, to long. 12, lat. 10 mm.), slightly longer than broad, without the slightest indication of a neck. Sepals erect, 15 mm. long, some with linear lobes; the margins woolly, the dorsal surface with loose arachnoid hairs and scattered gland-hairs. Peduncles perfectly glabrous and somewhat glaucous, 5–10 mm. long. Infrastipular spines variable, present or absent. Spines on flowering branchlets straight. Stipules very narrow, diameter 2–4 mm., beneath with loose arachnoid hairs and short reddish-gland-hairs; petioles minutely pubescent, with scattered short red gland-hairs; leaflets 7 to 9, rather narrow (*e.g.*, long. 23, lat. 12½ mm.), resin-dotted beneath, simply toothed, edges not glandular, lateral leaflets briefly petiolulate. A low bush.

It will be seen that this in many respects approaches *R. pecosensis. R. arkansana,* var. *a,* was infested by an aphid, which appears to be identical with *Myzus rosarum* Walker.

In order to appreciate the characters of the Pecos roses, it is necessary to review the described North American species of the same group, and also certain forms occurring in other parts of New Mexico.

THE DESCRIBED SPECIES.

(1) **Rosa grosseserrata** E. Nelson.

Bot. Gaz., August, 1900, p. 119.

Type from the Yellowstone Park, collected in fruit. I am indebted to Prof. Aven Nelson for a specimen: This is quite like typical *R. pecosensis* in the serrations and pubescence of the leaves; the serrations are long and pointed, perfectly simple and not glandular. The stipules are broader than in *pecosensis.* The fruit is considerably larger, about 12 mm. diameter. The author of this species-name thinks the plant is intermediate between *R. pisocarpa* and *R. woodsii,* and I believe that it is not so close to *pecosensis* as the resemblance of the leaves might suggest. The absence of paired infrastipular spines or prickles seems to remove *R. grosseserrata* from the vicinity of *R. pisocarpa* and *woodsii*, but I am convinced that the value of this character has been much exaggerated. Crépin in his table (1896) indicates the variability of *pisocarpa* in this respect.

(2) **R. arkansana** Porter.

Much emphasis has been placed upon the statement in the original description that the sepals are reflexed in fruit. This seems to distinguish my plant from the true *arkansana* (the fruit was unknown when I consulted Dr. Rydberg), but I strongly suspect that, as is usual in the group, the sepals are more or less reflexed at first, but ultimately erect. Another discrepancy is in the leaflets, which are 9 to 11 in true *arkansana*, but 7 to 9 in my plant. The other characters seem very similar in both plants.

(3) **R. fendleri** Crépin.

I regret very much that I cannot make sure of *fendleri*, but this is perhaps not surprising, as Crépin himself did not know what to do with it twenty years after its description. Dr. Rydberg writes: "My idea of *R. fendleri* is a low shrub with evident infrastipular spines, and with stipules, petioles and peduncles glandular." No such rose as this was found at Pecos. Rehder's account of *R. fendleri* (in Bailey's *Cyclopedia of American Horticulture*) indicates a totally different plant from that indicated by Dr. Rydberg, much more in the manner of *R. pecosensis*. However, the sepals are said to be quite entire, and the flowers normally in clusters.

(4) **R. gymnocarpa** Nuttall.

Easily separated from ours by the deciduous sepals.

(5) **R. neomexicana** Ckll.

Fruits oblong; see above.

(6) **R. aciculata** (Ckll.).

Wet Mountain Valley, Colorado. Described as *R. blanda* var. *aciculata* in *Science Gossip*, 1889, p. 188. Type at Kew; photographs distributed to several herbaria. This has the flowers not very large, bright pink; prickles straight, slender, pale; sepals entire, hispid; stipules dilated, entire or slightly toothed at apex; leaflets 5 to 7, broad-oval, simply serrate, pale beneath. There are no paired infrastipular prickles. This appears to be allied to *R. sayi*, which occurs in the same vicinity, but the leaves are very much smaller, and their marginal teeth are normally simple.

(7) **R. sayi** Schwein.

Low, with large, thin, doubly-serrate leaflets; grows in moist places, and occurs as far south as Beulah, New Mexico. Just how far the characters of this rose result directly from its surroundings is perhaps an open question. If it could be transferred to a dry sunny place the result might be something not very different from *aciculata;* but this is mere guessing. The type locality of *sayi* is somewhere near the British boundary.

(8) **R. engelmanni** S. Wats.

Rehder gives this and *sayi* both as varieties of *R. acicularis* Lindley, but this seems unreasonable. I have found *R. engelmanni* abundantly near the Halfway House on Pike's Peak, Colorado, and it seems very distinct by its greatly elongated fruit.

(9) **R. pratincola** Greene.

The prairie species, formerly confused with *arkansana.* It is only one or two feet high, and has 7 to 11 leaflets. The stipules are only softly pubescent.

(10) **R. suffulta** Greene.

A low form of open ground, described from Las Vegas, New Mexico, where I have collected it. I found it many years ago at Ula, Colorado, and described it in MS. as a new variety of *R. arkansana,* but the description was not published. My specimen is at Kew. The flowers are quite large, 66 mm. across, the petals pale, and often inclined to be streaked.

(11) **R. manca** Greene.

W. Mancos Cañon, S. Colorado, at 10,000 feet. Another of the small species, about a foot high. The recurved prickles, small flowers, very narrow stipules, etc., distinguish it.

(12) **R. macounii** Greene.

Assiniboia to Cheyenne, Wyoming. A low shrub of dry elevated plains; leaves wholly glandless, leaflets mostly 9 or 11; flowers solitary, small and rather pale; fruits depressed-globose.

(13) **R. woodsii** Lindley.

A northern species, apparently not found in New Mexico. According to Watson, it is distinguished by the presence of infrastipular spines and laterally lobed outer sepals, and is usually a low bush, not over three feet high. Rydberg (*Flora of Montana*) states that the *R. fendleri* of Watson and Coulter is the true *R. woodsii,* and remarks that the character of lobed sepals is inconstant, and that in Lindley's original description they are said to be entire. The fruit is small and red, and the leaves are nearly glabrate, and according to E. Nelson shiny, those of *R. fendleri* being dull. Rehder in his table says the sepals of *R. pisocarpa* and *fendleri* are quite entire, while those of *woodsii* are lobed; in this he doubtless merely follows Watson. He suggests, however, that *pisocarpa* and *fendleri* may be varieties of *woodsii*. Crépin, in 1896, dismissed *woodsii* as a doubtful species. Lindley, in his first description, said the prickles were scattered, becoming paired (under the stipules) toward the extremities. In *Bot. Reg.*, XII, Pl. 976, he figured them as quite regularly paired, both on the branches and floriferous branchlets; the leaflets are represented as oboval and attenuate at base, with simple teeth. It will be apparent from all this that *R. woodsii* is not well understood, but it seems to be a low northern form allied to the *R. neomexicana* of New Mexico, and not to any of the Pecos roses.

There is in the Kew herbarium a rose labelled *R. arkansana*, from Medicine Hat, June 1, 1894, John Macoun, 4,567. It has the leaflets in sevens, pale, more or less cordate or truncate, varying to more rounded, sharply serrate; flowers rather small, corymbose; sepals reflexed after flowering, without lateral lobes. This is certainly not *R. macounii*, nor can it very well be the real *arkansana;* may it be the genuine *woodsii* ?

(14) **R. maximiliani** Nees.

A species of western Nebraska, differing from *woodsii* by its larger yellow fruit and more pubescent leaves.

(15) **R. blanda** Aiton.

A smooth, slightly prickly rose of Hudson's Bay and Newfoundland. Various Rocky Mountain plants have been confused with it.

(16) **R. acicularis** Lindley.

An Arctic species of the Old World (Siberia and northern Europe), said by Watson to occur in northern Alaska. It has oblong fruit; leaves with five leaflets, with simple teeth and not glandular beneath. The Rocky Mountain representative is *R. engelmanni*.

(17) **R. californica** C. and S.

This Californian rose is represented in the Rocky Mountains by var. *ultramontana* Watson, which Crépin thought rather a variety of *R. pisocarpa*. Dr. Rydberg, after seeing my description of *R. pecosensis*, suggested that it might be "*R. californica ultramontana*, a good species not closely related to *R. californica*, and growing in Utah, Wyoming and Colorado." However, when this suggestion was made the fruit of *R. pecosensis* had not been discovered.

(18) **R. pisocarpa** Gray.

A species of Oregon, with oval leaflets, stipules and bracts entire, small flowers and small globose fruits. Extends northward to British Columbia.

(19) R. nutkana Presl.

Alaska to Utah, but there is no evidence that it occurs as far south as New Mexico. Rydberg says: "Recognized by its large flowers, stout spines, doubly serrate firm leaves and large fruit." This suggests *sayi*, but the latter has thin leaves, and lacks the infrastipular spines of *nutkana*.

(20) R. macdougali Holz.

A species of the northern Rocky Mountains, distinguished from *nutkana* by the densely bristly peduncles, and the infrastipular spines much smaller.

(21) R. melina Greene.

A Colorado species confused with *nutkana*, but distinct by its small glabrous foliage, short and hooked prickles, and sepals neither long-attenuate nor glandular on the back. The fruit is very large, somewhat obpyriform, nearly 1½ inches in diameter. Perhaps the Utah "*nutkana*" will also be found to belong here.

There are still other species of Cinnamomeæ, but from their distribution and characters they do not require consideration here. It is hoped that the above summary will facilitate the identification of Rocky Mountain roses.

SOME NEW MEXICO ROSES.

(1) Manzanares Valley, New Mexico (Mary Cooper). A rose with large leaves, having the characters of *R. sayi*, but the serrations only very slightly compound. Inflorescence one-flowered, flowers bright pink. A moderate number of prickles on flowering branch. The lateral leaflets are about 30 mm. long and 20 broad. I refer this to *R. sayi*, variety.

(2) Santa Fé, New Mexico (Cockerell); in herb. N. M. Agric. College. Flowering stems with numerous slender straight prickles; stems not dark; leaflets often in elevens, cuneiform with broadly rounded ends, very slightly inclined to be doubly serrate, about 28 mm. long and 18 broad, color on both sides nearly the same; sepals narrow, covered with large knobbed gland-hairs; fruit red, rather large, obpyriform, almost globular; sepals persistent. This runs to *R. arkansana* in Crépin's table; it is nearly the same as *R. suffulta*, differing by the very obtuse leaflets and more glandular sepals. Can this be the genuine *R. fendleri*?

(3) White Mountains, New Mexico (Turner); in herb. N. M. Agric. College. This was found labelled "*fendleri*," but it is very different from the Santa Fé plant by its dark flowering stems, with few but

straight and strong ochreous spines; leaves pale beneath, leaflets 5 or 7; flowers bright pink, not large. This is *R. neomexicana.*

In 1895 Prof. Wooton collected a rose on White Mountain, New Mexico, with corymbose flowers and very long and narrow leaflets having very long sharp teeth. The stem is dark, with rather numerous light ochraceous slightly curved prickles. This is much like an Illinois specimen of *R. blanda,* and requires further investigation.